

(12) **UK Patent Application** (19) **GB** (11) **2 372 405** (13) **A**

(43) Date of A Publication 21.08.2002

(21) Application No 0104169.8

(22) Date of Filing 20.02.2001

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(51) INT CL⁷

H04M 15/00

(52) UK CL (Edition T)

H4L LRCMC

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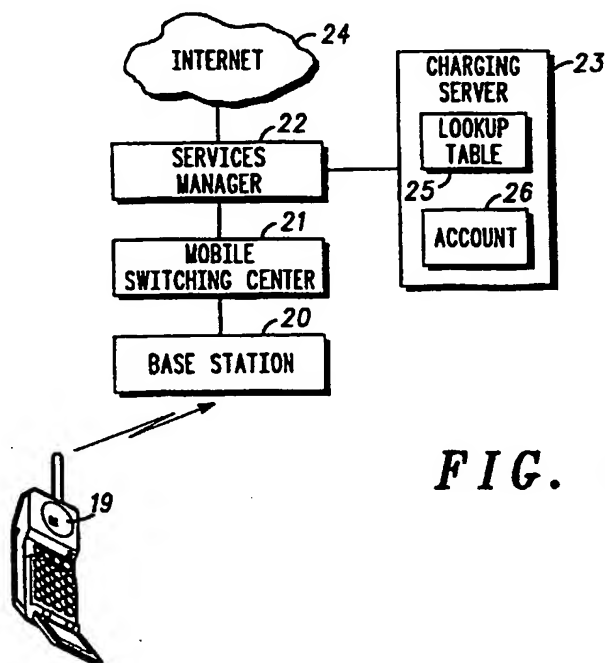
(58) Field of Search

UK CL (Edition S) H4L LRCMC LRNMB
INT CL⁷ H04M 15/00 15/02 15/04 15/06 15/08 15/10
15/12 15/14 15/16 15/18 15/20 15/22 15/24 15/26
15/28 15/30 15/32 15/34 15/36 17/02, H04Q 7/22
Online: EPODOC, JAPIO, WPI. And ICO code
T04Q7/38W7.

(54) Abstract Title

Communications services charging and billing apparatus and method

(57) A charging server (23) provides a mechanism for a services manager (22) to bill a subscriber (19) for information supplied over a wired or wireless network (20, 21) depending on content of the information rather than by duration of the call. The charging server (23) manages a subscriber's pre-paid account (26) which it debits by a fixed charge depending on the type of information supplied eg weather forecast, stock market report, sports results. Supply of requested information can be withheld if there are insufficient funds in the account to cover the charges.

**FIG. 3**

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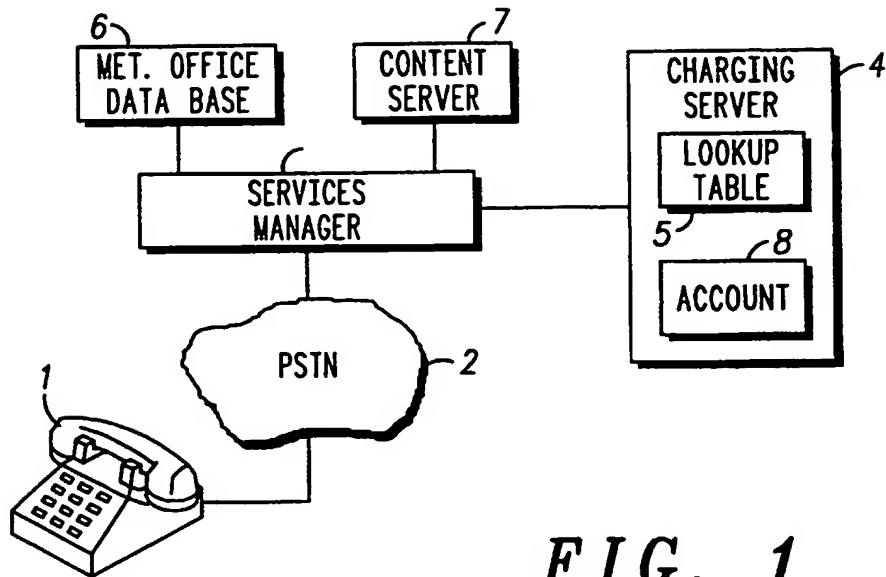


FIG. 1

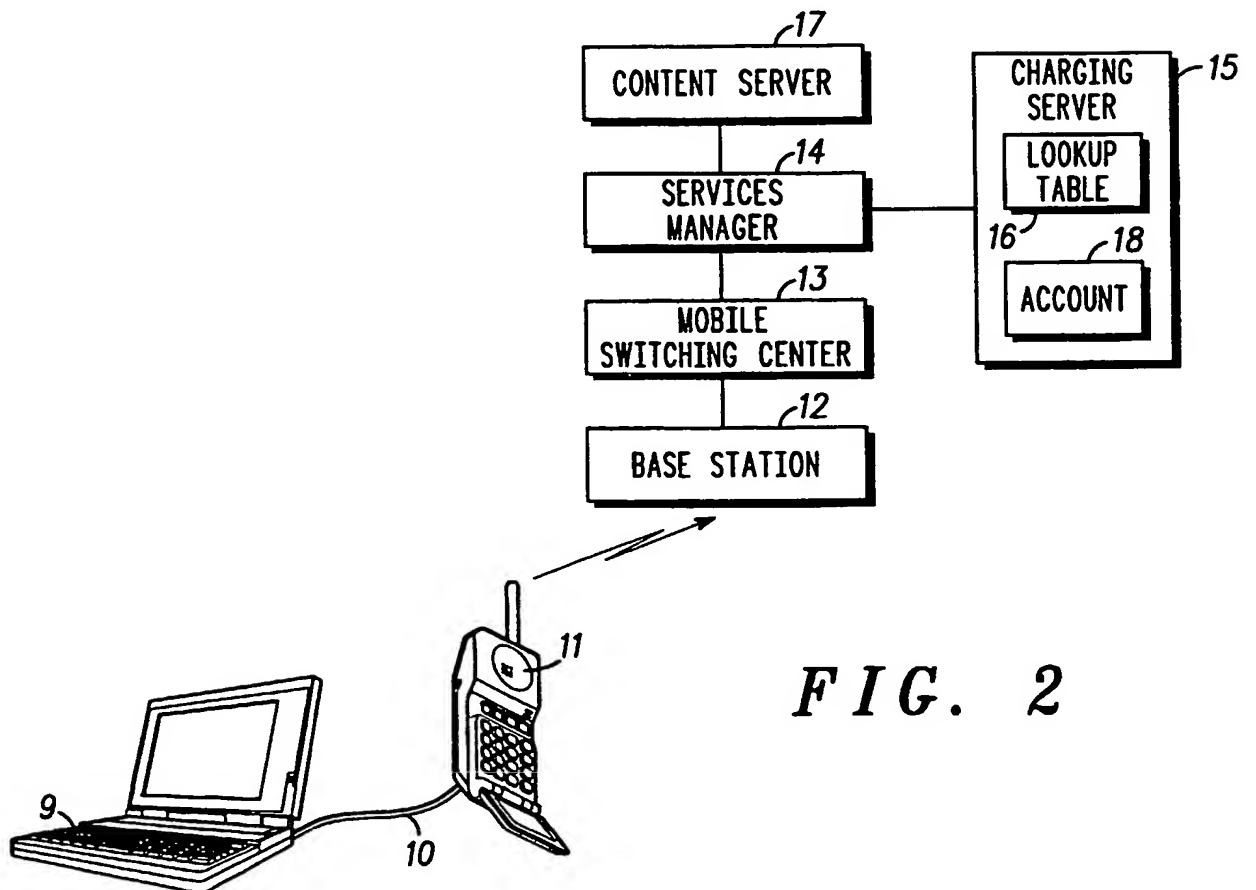


FIG. 2

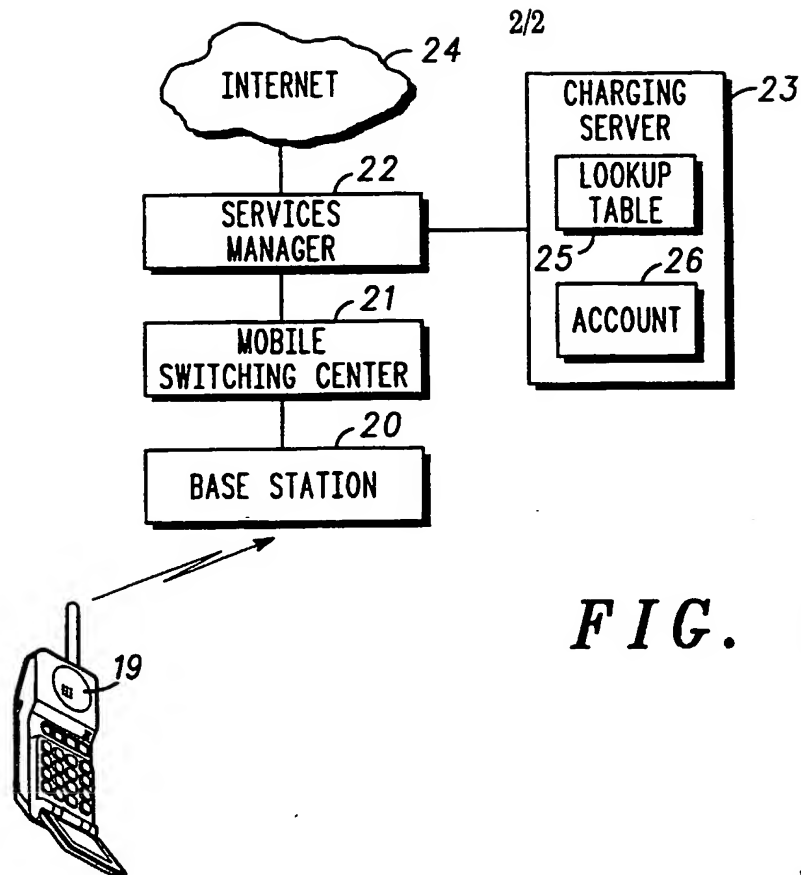


FIG. 3

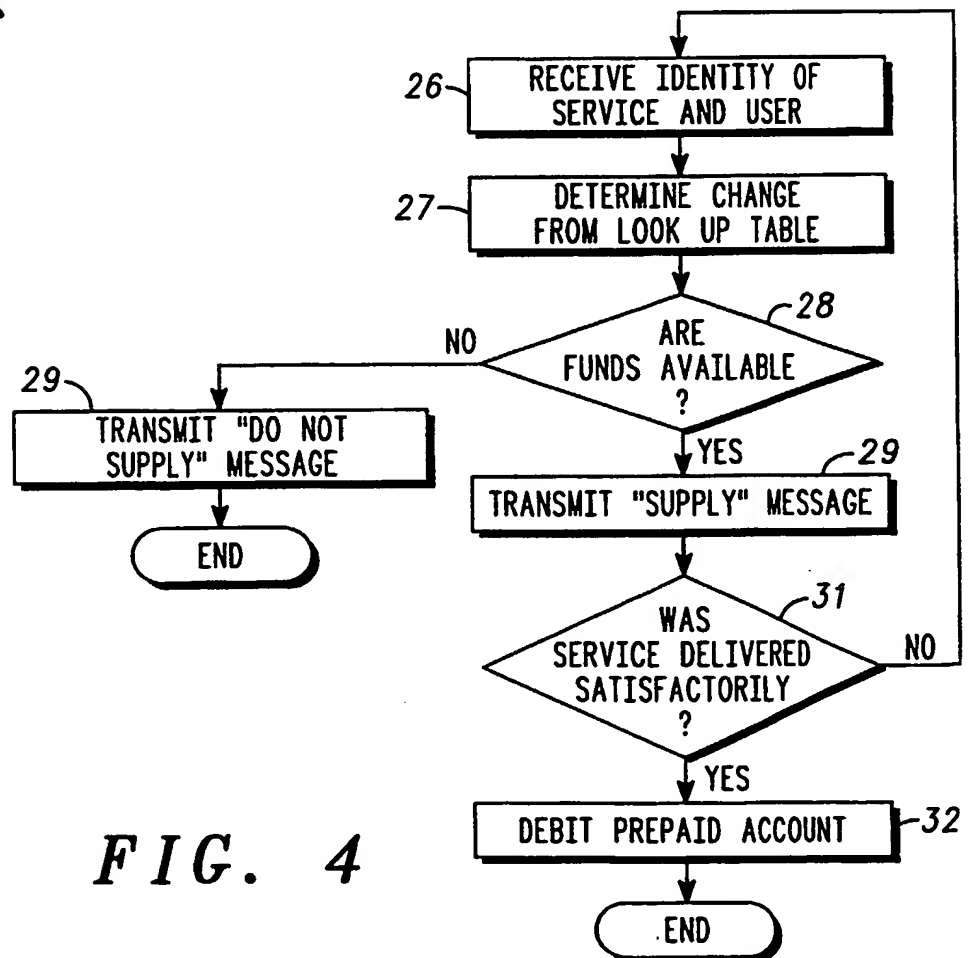


FIG. 4

5 **COMMUNICATIONS SERVICES CHARGING AND BILLING APPARATUS
AND METHOD**

This invention relates to an apparatus and method for billing or charging services supplied to a subscriber or other end user. The invention is
10 applicable to both wired and wireless telecommunications networks (including data communications networks) and particularly to wireless networks.

One particular type of wireless telecommunications network is the GSM Network (Global System for Mobile Communications) which is made up of
15 mobile switching centres (MSC), Base Stations (BS) and subscriber units often referred to as mobile stations. With the mobile switching centres, base stations and mobile stations, the network can make calls, receive calls, perform billings, etc as any normal public switched telephone network (PSTN) is able to do. The mobile switching centres and base stations are installed and
20 managed by the network operator.

Another type of network, to which the invention has applicability, is the Universal Mobile Telecommunications System (UMTS) or "3G" system currently under standardisation. In a 3G system base stations termed node
25 B's are controlled by a radio network controller (RNC). 3G systems are configured to support voice calls and packet data transmissions.

A mobile station consists of two parts, a mobile equipment (ie a mobile 'phone or cell 'phone) and an electronic smart card called a subscriber identity module
30 (SIM). The mobile equipment is the hardware used to access the network. The hardware has an identity number associated with it, which is unique for that particular device and permanently stored in it. The SIM is a card or module which plugs into the mobile equipment. This card or module identifies the user. By making a distinction between the user identity and the mobile
35 equipment identity, the network can route calls and perform billing based on the identity of the user rather than the equipment or its location. Billing is computed in a charging and billing centre which is linked to the mobile switching centre.

There are two main aspects to the relationship between a network operator and its subscribers. Firstly, a commercial dialogue must be initiated which would lead to a subscription relationship being established, ie an entitlement to obtain telecommunications services from the network which requires actions on the network equipment so that the subscribers are recognised as such. The second aspect is billing and accounting. The operator must calculate the call charges and bill its own subscribers.

A commercial structure which is becoming more common is based on the concept of service providers. Service providers are companies, usually distinct from the operator, who take the responsibility for the commercial contact with the customers. This includes typically, the establishment of the subscription and the dispatch of the bills to the subscribers. Usually, the operator bills globally (wholesale billing) the service provider for all charges related to the subscribers managed by the latter and provides the service provider with toll ticket information necessary to produce the individual bills (retail billing). This requires recording mechanisms in the traffic handling part of the system so that sufficient data is recorded for each chargeable service.

Toll tickets are individual records generated for each voice or data call, session or transaction which contain the information necessary to calculate a charge and are created by the mobile switching centres. Information related to charging includes date and time of the beginning of a voice call, its duration, the called number and the identity of the caller. This information is relayed from the mobile switching centre to the charging and billing centre, the latter being operated by either the service provider or the network operator. Similarly, for data sessions in a packet data type environment, network components can be configured to provide billing or charging event data.

Two types of billing and charging methods are currently in common use. In the first type, the network operator or service provider prepares a monthly invoice of telecommunications charges for the subscriber. The second type is a pre-paid system where the user purchases "top-up" credits which are registered to access or continue service. The user then has a certain amount of credit recorded with the network operator against his identity which is debited each time he makes a call.

Charges for voice calls are based on duration of the call and may vary depending on time of day and destination type. Charges for text messages sent between mobile subscribers and using the short message service (SMS) are often set at a fixed charge per message, irrespective of message length.

In addition to enabling voice calls and text messages between a subscriber and called party, network operators also provide voice-based information services to users. For example, a subscriber can dial a specific number from his mobile station which will automatically link him to an information service supplied by the network operator. Some examples of such information services presently available are share prices, road traffic reports and weather forecasts. Charges for these services are made by the network operator and are based on the duration of the call. Rates may also be varied depending on the time of day when the call was made.

Having to pay for such information services by duration of call time may not be attractive to the subscriber. A subscriber may, for example, prefer to pay a fixed fee for a particular information service.

Service managers (such as content providers and applications service providers) who provide services such as weather forecasts, sports reports, travel information, e-commerce services, etc from links with the Internet and various content servers and organisations may wish to supply users with this managed service over telecommunications networks, wired and/or wireless. Current charging and billing systems do not allow for these service managers to charge users for the information they can provide. Being able to charge a user for the supply of information over a communications network would be commercially attractive to such a services manager.

According to a first aspect of the present invention, a charging server is provided for charging for services supplied by a services manager via a telecommunications network, the charging server including, means for receiving an identification of a specific type of service requested, means for determining a charge for supplying the required service depending on its specified type, and means for recording the determined charge.

Services may be requested by any user of the telecommunications network such as an individual or some other entity such as a Company.

- 5 Examples of specific types of services provided by the services manager are weather reports, news flashes, stock market prices, E-commerce transactions, sports results, E-Mail messages.

- 10 Each type of service may have a fixed charge associated with it. Hence the invention provides a mechanism for charging a user depending on the type of the service supplied rather than the number of bytes transmitted or the duration of any communications link between the user's telephone or personal computer and an associated network.

- 15 The charging server may be managed by the services manager, a service provider or the operator of the telecommunications network.

- 20 The identification of a specific type of service to be supplied may come from the services manager at the instigation of the user via his mobile 'phone, fixed 'phone or personal computer, for example. Alternatively, the user may have an arrangement with the services manager whereby he receives a sports result as it occurs or a specific service at regular intervals, eg stock market prices daily at a fixed hour. In this case, the identification is instigated by the services manager directly.

- 25 The means for determining the associated charge for a particular type of service may include a look-up table listing charges versus service type. This may be altered or updated from time to time by the services manager. A proportion of the charges listed for each type of service may include a network operator's charges for the air-time consumed, or this may be charged separately. Access to the look-up table may be provided directly to the services manager on request so that the services manager can inform a user via the telecommunications network of the cost of a particular service, should he require it.

- 35 The means for charging the user may be adapted to manage a user's account by recording charges incurred against a user's identity. This information may

then be used for issuing an invoice to the user for subsequent payment. The user's identity may be his telephone number or some other identity known to the services manager and used for authentication and charging purposes.

- 5 Alternatively, the means for charging may be configured to work as a pre-paid system wherein the user's pre-paid account (held in the charging server) is debited in respect of the services supplied. Known mechanisms for establishing and topping up such a pre-paid account may be employed. Such known mechanisms include payment by charge card, credit card or pre-pay
10 vouchers. The account however may be set up with the services manager rather than the network operator which is the case in the known systems.

- 15 In the case of the pre-paid configuration, it is preferable for the charging server to be configured so that before the service is supplied, it is established that there are sufficient funds to cover the charges. The charging server is further adapted to inform the services manager if this is the case or not. If not, the charging server may instruct the services manager not to supply the service.

- 20 In a preferred embodiment, the means for recording is adapted to record the charges (either by adjusting a user's invoice or debiting the pre-paid account) only after the charging server has received confirmation that the service has been successfully supplied to the user. For example, the user receiving the service on a mobile 'phone may move out of the coverage or the phone's battery might exhaust its charge during transmission and therefore not receive
25 all the information that he had requested. In such cases, the user would not expect to have to pay any charges.

- 30 As a further option, the charging process may be arranged to be segmented in cases where two or more attempts are required to successfully deliver the service to the user.

- 35 In an alternative embodiment and where charges are recorded or deducted prior to delivery of the service, the means for charging may be arranged to credit a user's account on notification to the charging server that the service delivery was unsatisfactory or incomplete.

In a further embodiment, the charging server is configured to inform a user (on request) of the monetary amount currently residing in his pre-paid account.

The request from the user and subsequent response from the charging server may be made via the services manager and the telecommunications network.

- 5 The charging server may be further configured to send (via the services manager and the network) a warning of imminent exhaustion of funds (in a pre-paid account) or over-expenditure of a pre-set limit in the alternative case of an invoicing payment system.

- 10 In a second aspect of the present invention, there is provided a method of charging for services supplied by a services manager via a telecommunications network, the method including the steps of, receiving an identification of a specific type of service requested, determining a charge for supplying the requested service depending on its
15 specified type,
and recording the determined charge.

The step of recording may include recording the determined charge against a user's identity for enabling preparation of an invoice for future payment.

- 20 Alternatively, the step of charging may include debiting a pre-paid account associated with a user.

- In a preferred embodiment, the method further includes the step of instructing the services manager not to supply the required service or even to present the
25 option of the service to a user if there are insufficient funds available.

- In a further embodiment, the method includes the further steps of receiving confirmation that a required service has been successfully supplied and delaying execution of the recording step until such confirmation has been
30 received.

- In a further embodiment, the method includes the further steps of receiving notification of a faulty delivery of a required service and crediting a user's account accordingly.

35

In a third aspect the invention also provides a computer program product comprising an applications programming interface or medium on or in which is

recorded a program which, when executed in a computer-controlled system, will perform any of the above methods.

5 The invention may be used with a wireless telecommunications network, for example mobile cellular network or with a wired land line network. It is also compatible for use with any type of conventional user terminal, for example, mobile 'phone, fixed 'phone, fixed wireless terminal, personal digital assistant, personal computer or facsimile machine. Communications between the services manager and the user's terminal over a network may be by packet
10 data or voice, for example. The invention is further compatible for use with both public and private networks.

The invention enables a services manager, which may be arranged to manage the charging server, to charge a user for services it supplies to him. This is
15 commercially advantageous to the services manager. The invention also enables the services manager to set charges at a rate dependent upon the type of service or information content provided to a user. This is also an attractive arrangement for the user who is likely to find payment according to content of information more acceptable than by number of bytes transmitted or
20 call duration. For example, if the user knows that he will be charged, say, 20 pence for a weather report, he is more likely to use the service than if the charge were to be made on a call duration basis, for example, because the user would not know in advance how long the call was going to last. It is also more attractive than a cost proportional to bytes transmitted because again the
25 user would have little idea of how many bytes were involved in transmitting a weather report. This advantage is particularly relevant in the case where the user has a pre-paid account.

The invention provides a further advantage, in the case where the services
30 manager manages the charging server, of enabling the user to access services while roaming. If the user has a roaming agreement with his home network operator, then he can access the services from any location. With known systems, information services such as weather reports, share prices, etc are only available to pre-paid users from network operators when the user is
35 located in his home network operator's area of coverage.

A further advantage is that the services are accessible to the user irrespective of the network operator that he is registered with.

Further, the invention can be used with various types of network, for example, GSM and 3G as already mentioned and others such as the general packet radio services (GPRS), without modification, to their radio access systems.

An additional advantage is that there is no requirement for the telecommunications network to understand that the type of data it is carrying be it voice, E-Mail, video, etc, or for it to know what charges are associated with the pay-load. This obviates any need for additional infrastructure for identifying the type of data transmitted and any associated cost to the network operator.

An advantage of a preferred embodiment of the invention is that no service would be supplied to a subscriber until funding was confirmed.

Some embodiments of the invention will now be described, by way of example only, with reference to the drawings of which:

Figure 1 is a schematic block diagram of a charging server in accordance with a first embodiment of the invention and operating in a wired telecommunications network,

Figure 2 is a schematic block diagram of a charging server operating in accordance with a second embodiment of the invention and in a wireless telecommunications network,

Figure 3 is a schematic block diagram showing a charging server in accordance with a third embodiment and operating in a wireless communications network, and Figure 4 is a flow chart illustrating operation of the embodiment of Figure 3.

In Figure 1, a fixed subscriber terminal 1 is provided with a connection to a PSTN 2. A services manager 3 is linked to the PSTN 2 and also to a charging server 4. The charging server 4 includes a look-up table 5 which lists types of services versus associated charges. The services manager 3 also has links to

various content servers, two being shown in the Figure, 6 and 7. The server 6 is a meteorological office database.

5 The user who has access to the terminal 1 has an account 8 with the services manager 3 and which is implemented in the charging server 4. The user also has an arrangement with the services manager 3 such that the services manager 3 calls the subscriber terminal 1 every day at a fixed hour and provides a weather forecast (via a voice message) for the user's locality.

10 Hence, in operation, the services manager 3 interrogates the meteorological office database 5 for the relevant forecast. It then calls the subscriber terminal 1 and transmits the forecast over the fixed PSTN network. Subsequently, it notifies the charging server 4 that it has provided this service and gives the charging server 4 an identification of the type of service provided and the
15 telephone number of the subscriber terminal 1, thereby identifying the user. The charging server 4 then determines from the look-up table 5 the charge associated with the delivery of a weather forecast. Knowing the user's identity from the given telephone number, it then charges the cost of the service to the user's account 8. Subsequently, the user is issued with an invoice prepared
20 by the charging server.

In the embodiment of Figure 2, a personal computer 9 is connected by wire link 10 to a mobile 'phone 11. The computer 9 and 'phone 11 are operated by and located together with a user. The mobile 'phone 11 communicates over an air
25 interface with its serving base station 12 which in turn is connected by land line to a mobile switching centre 13. The mobile switching centre 13 is linked to a charging services manager 14 which is also linked to an associated charging server 15. The charging server 15 includes a look-up table 16 which lists the types of services versus associated charges.

30 The services manager 14 also has links to content servers, one of which shown and designated 17 in the Figure.

The mobile 'phone 11, base station 12 and mobile switching centre 13 all
35 support GPRS.

The user who operates the personal computer 9 and mobile 'phone 11 has a pre-paid account with the services manager 14 which he has established by purchasing a pre-paid voucher and registering his identity and the voucher details with the services manager 14. The services manager 14 has
5 transmitted this information to the charging server 15 which manages the subscriber's pre-paid account 18.

The user now wishes to access his E-Mail messages which are held in the content server 17 and which is managed by the services manager 14. The
10 user dials from his mobile 'phone 11, the appropriate number for setting up a link between himself and the services manager 14 for E-Mail access. The service manager 14 identifies the user and the incoming call as a request for E-Mail message supply. It subsequently sends a message to the charging
15 server 15 notifying it of the type of service required by the user (ie E-Mail delivery) and the user's identity. It also asks the charging server 15 to report whether or not sufficient funds are available in the user's pre-paid account to cover the associated charges.

On receipt of this message and request from the services manager 14, the
20 charging server consults the look-up table 16 to ascertain the charge associated with E-Mail delivery. It then checks the user's pre-paid account 18 (knowing the identity of the user) to see if sufficient funds are available.

If sufficient funds are available, it sends a confirmation message back to the
25 services manager 14. On receipt of this confirmation message, the services manager 14 retrieves the subscriber's E-Mail message from the server 17 and transmits it over GPRS to the mobile 'phone 11 and personal computer 9 for displaying to the user.

30 Subsequently, the charging server 15 debits the user's pre-paid account 18 with the associated charge as listed in the look-up table 16.

(In accordance with known procedures, the operator of the mobile switching
35 centre 13 may additionally charge the user for the air-time consumed).

In the third embodiment of Figure 3, a user's mobile 'phone 19 communicates over an air interface with its serving base station 20 which in turn connected by

land-line to a mobile switching centre 21. The mobile 'phone 19, base station 20 and mobile switching centre 21 form part of a GSM network that also supports GPRS.

5 The mobile switching centre 21 is linked to a services manager 22 which is also linked to an associated charging server 23 and to the Internet 24. The charging server 23 includes a look-up table 25 which lists type of services versus charges and a pre-paid account 26 for the user.

10 The user has established his pre-paid account 26 with the services manager 22 and entered funds by purchasing a pre-paid voucher and registering his identity and the voucher details with the services manager 22. The services manager 22 has transmitted this information to the charging server 23 which manages the account 26.

15 In a first example of this embodiment, the user wishes to be informed of the outcome of a particular sporting fixture. Hence, he dials the appropriate number to link him over the GSM network to the sports results service offered by the services manager 22 and registers his request. Subsequently, when
20 the result is due, the services manager interrogates the Internet 24 for the required information. It then informs the charging server 23 that a sports result has been requested and the identity of the user who has made the request. The charging server 23 uses the look-up table 25 to discover the charge associated with the sports result service, checks the user's pre-paid account
25 26 and confirms to the services manager 22 that there are adequate funds available to meet the charges. The services manager 22 then sends the results over the GSM network as a text message via SMS (short message) service to the mobile 'phone 19. The charging server 23 debits the user's account 26 with the associated cost.

30 In a second example of the embodiment Figure 3, the user wishes to obtain the current share prices of certain companies. He thus dials the appropriate number to link him to the stock market service offered by the services manager 22 and enters, using the mobile 'phone's keypad, the identities of the
35 companies he is interested in.

With reference to Figure 4, the charging server 23 receives, at step 26, from the services manager 22 an identification of the type of service required and the identification of the user requesting it.

- 5 At step 27, the charging server then consults the look-up table to determine the associated charge for this service.

At step 28, the charging server consults the user's pre-paid account to determine whether sufficient funds exist to cover the associated charges. If
10 there are insufficient funds, then the charging server transmits at step 29 a message back to the services manager instructing it not to supply the requested service. If it is determined that there are sufficient funds, then, at step 30, the charging server instructs the services manager to supply the service. In this case, the services manager interrogates the relevant source
15 over the Internet 24 for the current share prices and transmits them to the user's mobile 'phone over GPRS.

At step 31 the charging server waits for confirmation from the services manager that the service has been delivered satisfactorily, or alternatively, that
20 there was a fault and service has not been delivered satisfactorily.
(Satisfactory delivery of service can be ascertained by the GSM/GPRS network in accordance with conventional techniques and reported back to the services manager).

- 25 If the charging server receives a report that the service has been delivered satisfactorily, then it debits the user's pre-paid account accordingly at step 32.

If delivery was unsatisfactory, no debit is made and the charging server awaits further instructions from the services manager.

30

The above embodiments show just a few specific examples of the types of services which can be charged using the present invention. Other examples include delivery of video data, facsimile messages and purchases over the Internet. In fact, the invention is applicable to the charging of any type of data
35 transmission.

13
CLAIMS

1. A charging server for charging for services supplied by a services manager via a telecommunications network, the charging server including,
5 means for receiving an identification of a specific type of service requested,
means for determining a charge for supplying the requested service depending on its specified type,
10 and means for recording the determined charge.
2. A charging server according to Claim 1 in which the means for determining a charge includes a look-up table listing charges versus service type.
- 15 3. A charging server according to either Claim 1 or Claim 2 in which the means for recording is adapted to record in an account, determined charges against the identity of a user requesting the service.
- 20 4. A charging server according to either Claim 1 or Claim 2 and further including a pre-paid account associated with a user requesting the service, and in which the means for recording is adapted to debit the pre-paid account by the determined charges.
- 25 5. A charging server according to any preceding Claim in which the charging server is adapted to instruct the services manager to withhold the supply of the requested service if there are insufficient funds to meet the determined charges.
- 30 6. A charging server according to any preceding Claim and further including means for receiving confirmation that the requested service has been successfully supplied, and in which the means for recording is adapted to delay recording of the determined charges until said confirmation has been
35 received.

7. A charging server according to any of Claims 3 or 4 and further including means for receiving a notification of a faulty delivery of a requested service, and in which the means for charging is adapted to credit the account on receipt of the notification.
- 5
8. A charging server according to Claim 3 or Claim 4 and further including means for sending a notification to a user requesting the service relating to the availability of funds in the account.
- 10
9. A method of charging a subscriber for services supplied by an information services manager via a telecommunications network, the method including the steps of receiving an identification of a specific type of service requested, determining a charge for supplying the requested service depending on its specified type, and recording the determined charge.
- 15
10. A method according to Claim 9 in which the step of recording includes recording, in an account, determined charges against an identity of a user requesting the service.
- 20
11. A method according to Claim 9 in which the step of recording includes debiting a pre-paid account associated with a user requesting the service.
- 25
12. A method according to any of Claims 9 to 11 and including the further step of instructing the services manager to withhold supply of the requested service if there are insufficient funds to meet the determined charges.
- 30
13. A method according to any of Claims 9 to 12 and including the further steps of receiving confirmation that the requested service has been successfully supplied, and delaying execution of the recording step until such confirmation has been received.
- 35

14. A method according to Claims 10 or 11 and including the further steps of receiving notification of a faulty delivery of a required service, and crediting the account accordingly.
- 5 15. A computer program product comprising a medium on or in which is recorded a program which, when executed in a computer controlled system will perform any of the methods in accordance with Claims 9 to 14.
- 10 16. A computer program product comprising an applications programming interface which when executed in a computer-controlled system will perform any of the methods in accordance with Claims 9 to 14.
- 15 17. A charging server substantially as hereinbefore described with reference to the drawings.
18. A method of charging a user for services received substantially as hereinbefore described with reference to the drawings.